JOP 178 Filament, Prominence and Cavity campaign

15/29 April 2009 and/or during the THEMIS campaign (September 23 to October 10 2009)

HINODE, SOHO/SUMER and CDS and EIT, TRACE

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Context
Our proposal is based on data obtained by SOHO/SUMER, Hinode/EIS and SOT and by GBs spectrographs. Spectral observations of solar prominences reveal different aspects of their physical structure according to the lines and continua that are detected (Schmieder et al 2000). Majority of prominence emission lines is formed in cooler parts by scattering of the incident radiation coming from the photosphere, chromosphere and transition region depending on the line-formation conditions. When observed on the limb, prominences typically appear as bright features against the dark corona. This is the case of chromospheric lines like Hα and other Balmer lines, Ca lines and Lyman line of Hydrogen, but also many transition-region lines formed inside the prominence-corona transition region (PCTR). Analysis of such optical and UV/EUV emission lines and continua, based on detailed non LTE radiative transfer modelling, can provide us good diagnostics of prominence thermodynamic parameters and the ionization state of the prominence plasma (Heinzel et al 2001, Schmieder et al 2003).

However, some important prominence parameters can be also deduced in a relatively simpler and more straightforward way which consists in analysis of the coronal brightness darkening typically observed at a prominence position. This was first suggested by Kucera et al 1998 and Schmieder at al 1999a who used the SOHO/CDS observations of selected coronal lines. This method was then further developed and nowadays and the darkening is explained by the mechanism of absorption of the coronal lines by the Lyman continua of H, He I and He II (Golub 1999, Mein et al 2001, or a recent work of Heinzel et al 2008).

On the other hand the instruments like SOHO/EIT, TRACE, XRT provide large field-of-view images and can be used to study prominences and cavities, including the eruptive prominences which may relate to CMEs. In XRT wavelength domain only cavities are observed because the absorption mechanism is not efficient at these wavelengths. Cavities are explained by the mechanism of emissivity blocking (Heinzel et al 2008). This can be produced by reduced density or presence of cool plasma (Schmieder et al 2004). Using multi-wavelength observations we can distinguish between the two mechanisms: absorption and emissivity blocking. These two different mechanisms are involved in reducing the intensity of the coronal radiation in presence of prominences and cavities.

References:

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Method
Follow a filament on the disk towards the limb (could be the same target as the Program of Berger)

Instruments
Hinode SOT/ Ca or Halpha (with changing wavelengths for Doppler shifts)
Filament vector magnetograms
Prominence fast observations in H alpha or Ca H line

EIS
Description:
Study 000310: written by N.Labrosse
ACRONYM: prom_rast_v1

XRT
Large field of view (512x512 arc sec) in long exposure time and different filters to get a large coverage of temperature
Set of filters: Al mesh, Al poly, Ti poly, thin Be
Lossless compression
Cadence: 5 or 10 min

SOHO

SUMER Lyman series of Hydrogen + CIII + SVI lines
(cancel the observation of Lalpha systematically in the following studies)
Study (Lyman_Klaus Wilhem)
SCI_OBJ= LYMAN_HIN_3
SCI_SPEC= LYMAN_HIN_3
Object=FIL
PROG_ID=3393

SCI_OBJ= LY_HIN_OFF
SCI_SPEC= LY_HIN_OFF
Object= PROM
PROG_ID=3387

Proposal of W. Curdt on April 2 2009
add a Mg X raster and try (on a best effort basis) also to complete one run which includes Ly-alpha.

CDS ARCONT1 and ARCONT2 (smaller fov, higher spatial resolution)

EIT 304 A, 195 A

Ground based observations
MSDP at Meudon solar tower.
THEMIS (filament fov) two weeks
Ondrejov multi line spectrograph
India (Udaipur, Nainital)
China (Nanging spectrographs)
Argentina Halpha filtergraph